

B4 camera 21/22, or in the case where it is not necessary to capture an image of a workpiece behind other workpieces by changing the orientation of the camera, the procedure may return to Step 200 when it is determined "Yes" in Step 205, to move the camera to another position/posture at which an image of the objective workpiece can be captured.

IN THE CLAIMS:

Please AMEND the claims in accordance with the following:

B5
sub C17 1. (ONCE AMENDED) A robot system having an image processing function for determining orientation, or orientation and position of a robot operation on an object of detection, the system comprising:

a robot;

a first image capturing device;

a memory storing reference models, each created based on an image of a reference object captured by said image capturing device in a different direction, and for each reference model storing information of the capturing direction of its associated image and information of an orientation of the robot with respect to the reference object, said reference object being the object of detection or having a shape substantially identical to that of the object of detection; and

a processor to perform matching processing on an image of the object of detection (captured by said first image capturing device) using said reference models to select one of the reference models whose image of the reference object matched with the image of the object of detection, and to determine the orientation, or the orientation and position of the robot operation to be performed on the object of detection, the determining based on the selected image of the reference object, based on said one reference model and the information of its associated capturing direction, and based on the information of the orientation of the robot with respect to the reference object that is associated with said one reference model.

2. (ONCE AMENDED) A robot system having an image processing function according to claim 1, wherein said reference models are obtained from a part of the image data of the reference object.

De sub C17 6. (ONCE AMENDED) A robot system having an image processing function

according to claim 1, further comprising:

a second image capturing device; wherein
said robot situates said second image data capturing device to have said determined orientation or to have said determined orientation and said determined position with respect to the object, and wherein

said processor processes second image data captured by said second image capturing device to detect position and/or posture of the object with respect to said second image data capturing device.

36 7. (ONCE AMENDED) A robot system having an image processing function according to claim 1 further comprising:

a second image capturing device for obtaining three-dimensional position; wherein
said robot situates said second image data capturing device to have said determined orientation or to have said determined orientation and said determined position with respect to the object, so that said second image data capturing device is directed to a characterizing portion of the object; and wherein

said processor detects three-dimensional position and/or posture of the object based on three-dimensional position of said characterizing portion obtained by said second image capturing device.

53007 11. (ONCE AMENDED) A robot system having an image processing function according to claim 7, wherein said robot operation is an operation of picking up at least one object from a plurality of objects overlapped with each other.

12. (ONCE AMENDED) A robot system having an image processing function for determining orientation, or orientation and position of a robot operation on an object of detection, the system comprising:

107 a robot;
a first image capturing device;
a memory storing reference models, each created based on images of each of different kinds of reference objects captured by said first image capturing device, and storing indicia of the kinds respectively associated with said reference models, and information of a different orientation of the robot with respect to each of the different images of the reference object of

each kind, each of said kind of reference objects potentially being the object of detection or an object having a shape identical to that of the object of detection; and

37 a processor to perform matching processing on an image of the object of detection (captured by said first image capturing device) using said reference models to select an image of one of said kinds of reference models, and to determine the orientation, or the orientation and position of the robot operation to be performed on the object of detection, the determining based on the selected image of the reference object, based on said one reference model, based on the indicia of the kind associated with said one reference model and the information of the orientation of the robot with respect to the reference object associated with said one reference model of said one kind.

13. (ONCE AMENDED) A robot system having an image processing function according to claim 12, wherein said reference models are obtained from a part of the image data of the reference object.

38 520 17. (ONCE AMENDED) A robot system having an image processing function according to claim 12, further comprising a second image capturing device, wherein said robot situates said second image data capturing device to have said determined orientation or to have said determined orientation and said determined position with respect to the object, and wherein

said processor processes second image data captured by said second image capturing device to detect position and/or posture of the object with respect to said second image data capturing device.

18. (ONCE AMENDED) A robot system having an image processing function according to claim 12, further comprising:

a second image capturing device for obtaining three-dimensional position; wherein said robot situates said second image data capturing device to have said determined orientation or to have said determined orientation and said determined position with respect to the object, so that said second image data capturing device is directed to a characterizing portion of the object; and wherein

said processor detects three-dimensional position and/or posture of the object based on three-dimensional position of said characterizing portion obtained by said second image

B8
capturing device.

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22. (ONCE AMENDED) A robot system having an image processing function according to claim 18, wherein said robot operation is an operation of picking up at least one object from a plurality of objects overlapped with each other.

23. (NEW) A method for automatically determining an arrangement of a workpiece relative to a robot, the robot comprising an imaging device affixed to an arm, the method comprising:

storing reference images of the workpiece or an object so shaped (workpiece/object) and reference arrangement information indicating arrangements of the robot and workpiece/object relative to each other when the images were captured;

from a known arrangement of the robot, capturing a working image of the workpiece with the imaging device;

finding one of the reference images that has a closest match to the working image; and

B10
determining a known arrangement of the robot relative to the workpiece based on information indicating the known arrangement of the robot, and based on the reference arrangement information corresponding to the found reference image.

24. (NEW) A method according to claim 23, wherein reference images and reference arrangement information is obtained for workpieces/objects of different shapes, and wherein the finding comprises first determining that a reference image of one of the different shapes matches the working image of the workpiece, and then finding one reference image of the shape that best matches the working image.

25. (NEW) A method according to claim 23, wherein the robot is used to capture the reference images, and wherein the reference arrangement information represents arrangements of the robot when capturing the reference images.

26. (NEW) A method according to claim 23, wherein a second imaging device is affixed to the arm and is used to determine additional arrangement information used to determine the known arrangement of the robot relative to the workpiece.
